

nature of the cephalic appendages which surround the mouth in a manner characteristic of the group.

The class Podostomata may be defined as a group of marine Arthropods in which the cephalic (*Limulus*) or cephalothoracic (Trilobites) appendages are in the form of legs, *i. e.* ambulatory appendages, usually ending in forceps or larger claws (chelæ), which in the sole living representative of the class are arranged in an incomplete circle around the mouth; the basal joint of each leg is spiny, so as to aid in the retention and partial mastication of the food. No functional antennæ, mandibles, or maxillæ. Eyes both compound and simple. Respiration by branchiæ attached to the abdominal appendages, which are broad and lamellate in Merostomata, and cylindrical, with narrow gills, in Trilobita. The brain supplying nerves to the eyes alone; the nerves to the cephalic or cephalothoracic appendages originating from an œsophageal ring; the ventral cord ensheathed by a ventral arterial system more perfectly developed than in insects or scorpions. Coxal glands highly developed, with no external opening in the adult. The class differs from the Arachnida, among other characters, in having no functional cheliceres ("mandibles") or pedipalps ("maxillæ"); in the cephalic appendages either ending in larger claws or forceps, or in being simple, the terminal joint not bearing a pair of minute claws or ungues like those of Arachnida and Insecta, enabling their possessors to climb as well as walk. Podostomata have no urinary tubes. *Limulus* undergoes a slight metamorphosis, while in Trilobites the adult differs from the larva in having a greater number of thoracic segments.

From the Crustacea the Podostomata differ in the lack of functional antennæ and mouth-parts, in the compound eyes having no rods or cones, in the brain innervating the eyes (compound and simple) alone, in the shape of the head and pygidium or abdominal shield, and in the arterial coat completely enveloping the central nervous cord.

The Podostomata are divided into two orders:—

- I. *Merostomata*, with three suborders: $\left\{ \begin{array}{l} \textit{Xiphosura.} \\ \textit{Synxiphosura.} \\ \textit{Eurypterida.} \end{array} \right.$
- II. *Trilobita*.

On the Anatomy and Classification of the Phytopti.

By Dr. ALFRED NALEPA.

The cephalothorax of the Gall-mites is unusually reduced, the abdomen, on the contrary, considerably extended and annulated. Besides the organs of the mouth the former bears only *two* distinctly quinquearticulate pairs of legs. The mouth-organs have the form of a more or less strongly bent rostrum. The stiletiform chelicereæ lie in a sucking-tube formed by the maxillæ, which is supported by the labium. The maxillary palpi are four-jointed, only the basal joint is amalgamated with the maxilla. At the extremity of the abdomen on each side of the anus there are two semilunar retrac-

tile plates, which serve sometimes to push the animal forwards, sometimes for attachment. At the base of the mouth-tube commences the narrow œsophagus, which traverses the nervous centre, and immediately after passing through this becomes widened into the gastro-intestinal tube. Pyriform glandular organs are appended to the narrow rectum. On each side of the nervous centre are the salivary glands, conglomerated unicellular glands. The sexual organs are unpaired. The sexual apertures are situated immediately behind the last pair of legs. In the male the sexual aperture appears as a fissure surrounded by swollen margins and with a supporting plate; in the female it is closed by a superior and an inferior opercular plate. The eggs and spermatoblast are developed from a single germinal layer. In the male animal this is sharply separated from the ducts and has a cylindrical form. Before the germinal layer there is a spherical dilatation of the seminal duct lined with glandular epithelium. The sperm-cells are very small, rounded cells. On each side of the female sexual aperture opens a small glandular organ (seminal pouch?). The rudiments of the sexual organs appear in the larvæ at first as solid cylindrical cell-bodies, the development of which has proceeded so far before the last moult that it is already possible to distinguish the sexes. The nervous centre is represented by a comparatively large, cylindrical ganglion; from its anterior part issue eight, and from its posterior part two nerves. To the present time the Gall-mites of twenty-four species have been closely investigated. On *Carpinus* I have found forms the abdomen of which is covered dorsally with shield-shaped half-rings. On *Populus nigra* Herr P. Olschar collected deformed buds exactly like those of *P. tremula*, and which, I believe, have not yet been described.—*Anzeiger Acad. Wiss. Wien*, 18th November, 1886, p. 220.

On the Conodonts. By MM. J. V. ROHON and K. A. VON ZITTEL.

The curious minute fossils originally described by Pander under the name of Conodonts, and which he supposed to be the teeth of cartilaginous fishes of Silurian times, have been referred by subsequent authors to various types of organisms. They have been regarded as fragments of crustaceans, as the teeth of fishes allied to *Myxine* and *Petromyzon*, and as spines and teeth of naked Mollusca and Annelids. Dr. Hinde, who described many forms of these fossils from Silurian and later rocks, subsequently identified some of Pander's species with Annelid jaws.

The authors have discussed the question of the true nature of these problematical little fossils in considerable detail, and have described and figured their minute structure as made out by microscopical examination of thin sections, and summarize the results of their investigations in the following words:—"All the forms consist of parallel-layered conical laminae, arranged one over the other, and which are sometimes traversed by fine radial canals." They then proceed to a comparison of the structures recognized by them with those displayed by the various recent objects with which the Conodonts